REMARKS

The present communication is responsive to the Official Action mailed September 12, 2002. A petition for a three-month extension of the term for response to said Official Action, to and including March 12, 2003, is transmitted herewith.

Claims 1-6, 8-13, 15-18 and 20 were rejected under 35 U.S.C. § 102(e) as anticipated by *Nicewarner, Jr. et al.*, U.S. Patent 5,646,446. Reconsideration and withdrawal of this rejection are respectfully requested.

As the Official Action addresses independent claim 9 first, that claim is addressed first in the present remarks. By the present amendment, claim 9 has been modified to delete unnecessary verbiage concerning "a plurality of attachments sites" and to remove potentially confusing recitations of "flexible leads." It is believed clear from the specification as filed (*e.g.*, ¶ 0051; Figs. 1, 2) that the leads are part of the "wiring." Claim 9 has also been amended to eliminate an unnecessary recitation of "maintaining" the flexible substrate in the folded condition. Further, the claim has been amended to state explicitly that the assembling and folding steps are performed so that the "first electrical contacts" are accessible at "a bottom end" of the microelectronic assembly and so that the "second electrical contacts" are accessible at "a top end of said microelectronic assembly," and that the first and second microelectronic elements are disposed "between said top and bottom ends."

It is respectfully submitted that *Nicewarner* does not properly suggesting folding a flexible substrate so that second electrical contacts are accessible at a top end of said microelectronic assembly as recited in claim 9. While *Nicewarner*, indeed, teaches a set of first electrical contacts

referred to in the specification as "pads 69," which serve to connect the folded assembly to the "rigid package substrate 34" (col. 6, lns. 51-52) and which fall at the bottom end of the folded structure, nothing in *Nicewarner* is seen as properly disclosing any "second electrical contacts" which remain accessible at a top end of the microelectronic assembly after the folding step, as recited in claim 9. Nothing in the reference has been pointed out as suggesting that any function would be performed by such contacts.

The Official Action refers to "second electrical contacts 70c, 70d" (p. 3, ln.2), but this is believed to be incorrect. Elements 70c, 70d are parts of the leads extending along the flexible substrate and, indeed, are referred to as "flexible leads, 70a, 70b, 70c, 70d" in the Official Action itself (p. 3, lns. 5-6). While leads 70c and 70d are depicted in the reference drawings as extending to circular structures (Fig. 5), those structures appear to be nothing more than vias extending through the substrate; they are not characterized as connections or contacts or usable as such. Nor has anything in the reference been pointed out as showing that any of those structure would remain accessible at the top end of the folded structure. Merely by way of example, a via 48 is depicted in the upper right-hand corner of Fig. 3 in the reference. That via is entirely internal to the structure, and there is no suggestion that it should be exposed or accessible before or after folding.

It would be improper to assume that any conductive portion of the wiring structure (as, for example, vias 48) is capable of acting as an "electrical contact." Typical flex circuits have covering layers commonly referred to as "cover layers" or "cover coats" formed from polymers applied over the conductive elements except at those conductive elements which

are specifically adapted to serve as contacts and which must remain exposed. *See*, generally, Fjelstad, *An Engineer's Guide To Flexible Circuit Technology*, Electrochemical Publications Ltd. (1997), pp. 38-39, 68-69 (copy attached hereto). Absent any disclosure in *Nicewarner*, there is no reason to assume that any portion of the conductors 70c, 70d or the interconnecting vias are left exposed or uncovered along that portion of the folded substrate which forms the top end of the folded structure. Accordingly, the § 102 rejection of claim 9 should be withdrawn. The same rejection should be withdrawn as to dependent claims 10-13.

By the present amendment, new claims 28-33, dependent from claim 9, have been added. Claim 28 recites the further step of "making an electrical connection to said second electrical contacts after said folding step." As more particularly recited in claim 29, the step of making an electrical connection to the second electrical contacts may include making a test connection to these contacts (exemplified in ¶ 0062 of the specification). Alternatively, as recited in claim 30, this step may include attaching a further microelectronic assembly to the second electrical contacts (exemplified in ¶¶ 0065-0066 of the specification). Manifestly, *Nicewarner* does not suggest any process involving making electrical connections to any structure which remains accessible at the top end of a folded structure after the folding step. New claims 31-33 distinguish over *Nicewarner* for at least the reasons advanced above with respect to claim 9.

Independent claim 15 has been amended in a manner similar to the amendments to claim 9 discussed above and distinguishes over *Nicewarner* for the same reasons, as do dependent claims 16-18 and 20, also encompassed in this rejection. New claims 21-27 distinguish over *Nicewarner* for the

same reasons. In this regard, new claim 23 is specific to the case where only the first microelectronic element is attached to the substrate prior to the folding step, *i.e.*, where a folded structure is made while only one microelectronic element is attached to the flexible substrate (exemplified at, *e.g.*, Fig. 35 of the present drawings and paragraph 0069 of the present specification). The only discernable purpose of the *Nicewarner* structure is to interconnect multiple electronic elements, all of which are attached to the flexible substrate prior to folding. Claim 23, thus, further distinguishes over the reference. New claims 25-27 are analogous to claims 28-30 discussed above and distinguish over *Nicewarner* for the same reasons in addition to the reasons discussed above with respect to claims 9 and 15.

Independent claim 1 recites that, after the folding step, the "conductive terminals" are exposed at the bottom end of the stack assembly, whereas the test contacts are exposed on the stacked assembly remote from the bottom end of the stacked assembly. *See*, for example, Figs. 22 and 23, which show test contacts 901 disposed on the sides as well as on the top of the stacked assembly. Here again, *Nicewarner* has not been shown to disclose any element which might properly be characterized as a test contact exposed on the stacked assembly at any location remote from the bottom end of the stacked assembly. Claim 1 and, hence, claims 2-6 are believed to distinguish over *Nicewarner* for the same reasons. Claim 5 has been amended to delete an extraneous expression and thereby correct a typographical error.

Independent claim 8, also rejected under § 102 on *Nicewarner,* has been amended to correct the recitation of the relationship between the flexible leads and the "at least one attachment site," and to correct the reference to "text

contacts" to read -- test contacts --. The claim has been further amended to clarify that the conductive terminals and test contacts are exposed at the bottom and top ends, respectively, "after said folding step." This claim is believed to distinguish over *Nicewarner* for substantially the same reasons as discussed above with respect to claim 1.

Claim 7 was rejected under § 103 as unpatentable over *Nicewarner* as applied with respect to claim 1 in combination with *Akram et al.*, U.S. Patent 5,739,585. The Official Action does not assert that *Akram* offers any teachings which would remedy the deficiencies of *Nicewarner* pointed out above in connection with the § 102 rejection of claim 1, but instead merely relies on *Akram* as teaching the use of a dam in encapsulation. Accordingly, claim 7 is believed allowable over the combined references for the same reasons as discussed above in connection with claim 1. Additionally, in the combination of claim 7, the dam disposed between "two adjacent microelectronic elements" performs the additional function of limiting or preventing the flow of encapsulant onto a region of the substrate which is to be folded. Nothing in either reference suggests that a dam could be or should be used in this manner.

Claims 14 and 19 were also rejected under 35 U.S.C. § 103 on *Nicewarner* in view of a secondary reference. Although the Official Action (p. 9) states the rejection as being on *Nicewarner* in view of *Akram*, the body of the rejection refers to *Higashi et al.*, U.S. Patent 5,777,386 rather than *Akram*, and it is accordingly understood that the rejection is based on *Nicewarner* in view of *Higashi*. Here again, however, the secondary reference is not relied upon as teaching anything which would remedy the deficiencies of *Nicewarner* as discussed above in connection with the independent claims, and the § 103 should be withdrawn as to these claims as well.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

As it is believed that all of the rejections, objections and requirements set forth in the Official Action have been fully met, further favorable reconsideration and allowance of all claims in the application as amended are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: March 12, 2003

Respectfully submitted,

By_____

Marcus J. Millet
Registration No.: 28,241
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorneys for Applicant

LD-447\

Version With Markings to Show Changes Made

1. (AMENDED) A method of making a stacked microelectronic assembly comprising the steps of:

I. providing a flexible substrate having a plurality of attachment sites, said flexible substrate including a first surface and a second surface and having a plurality of electrically conductive terminals accessible at at least one of said first and second surfaces; test contacts accessible at at least one of said first and second surfaces; and wiring connected to said terminals and test contacts, said wiring including ~~and~~ flexible leads extending to said attachment sites;

II. assembling a plurality of microelectronic elements to said attachment sites;

III. electrically connecting said microelectronic elements and said leads;

IV. folding said flexible substrate and stacking at least some of said microelectronic elements in substantially vertical alignment with one another; and

V. maintaining said stacked microelectronic elements in said substantially vertical alignment, wherein said assembling and folding steps are performed so that after said folding step said conductive terminals are exposed at a bottom end of said stacked assembly and said test contacts are exposed on said stacked assembly remote from said bottom end.

5. (AMENDED) The method of claim 2, further comprising the step of

disposing a spacer ~~the flexible substrate~~ between two adjacent microelectronic elements.

8. (AMENDED) A method of making a microelectronic assembly, comprising the steps of:

I. providing a flexible substrate have at least one attachment site, said flexible substrate including a first surface

and a second surface and having a plurality of electrically conductive terminals accessible at at least one of said first and second surfaces; electrically conductive test contacts accessible at at least one of said first and second surfaces; and wiring connected to said terminals and said test contacts ~~and~~, said wiring including flexible leads extending to said at least one attachment site~~s~~;

II. assembling a microelectronic element to said attachment site;

III. electrically connecting said microelectronic element to said leads;

IV. folding said flexible substrate into a folded configuration having a folded portion; and

V. maintaining said flexible substrate in said folded configuration, said microelectronic element in said folded configurations;

VI. wherein said assembling and folding steps are performed so that after said folding step, said conductive terminals are exposed at a bottom end of said microelectronic assembly and said ~~text~~ test contacts are exposed at a top end of said microelectronic assembly.

9. (AMENDED) A method of making a stacked microelectronic assembly comprising:

providing a flexible substrate including ~~a plurality of attachment sites, said flexible substrate having~~ a first surface, a second surface opposite said first surface, first electrical contacts accessible at at least one of said first and second surfaces, second electrical contacts accessible at at least one of said first and second surfaces, wiring connected to said first and second electrical contacts, ~~and flexible leads extending to said attachment sites~~;

assembling first and second microelectronic elements to said ~~attachment sites;~~ flexible substrate and electrically connecting said microelectronic elements to said ~~flexible leads~~wiring; and then

folding said flexible substrate into a folded configuration,

said assembling and folding steps being performed so that after said assembling and folding steps said first electrical contacts are accessible at a bottom end of said microelectronic assembly and said second electrical contacts are accessible at a top end of said microelectronic assembly and said first and second microelectronic elements are disposed between said top and bottom ends~~; and~~

~~maintaining said flexible substrate in the folded configuration~~.

15. (AMENDED) A method of making a microelectronic assembly, comprising the steps of:

providing a flexible substrate ~~have at least one attachment site, said flexible substrate~~ including a first surface and a second surface and having a plurality of first electrical contacts accessible at at least one of said first and second surfaces, second electrical contacts accessible at at least one of said first and second surfaces, and wiring connected to said first and second electrical contacts~~, and flexible leads extending to said at least one attachment site~~;

assembling a first microelectronic element to said ~~at least one attachment site~~flexible substrate and ~~,~~electrically connecting ~~a~~ said microelectronic element to said ~~flexible leads~~wiring; and then

folding said flexible substrate into a folded configuration ~~having a folded portion; and~~

~~maintaining said flexible substrate in the folded configuration~~, said assembling and folding steps being performed so that after said assembling and folding steps ~~, wherein~~ said first electrical contacts are exposed at a bottom end of said microelectronic assembly and said second electrical contacts are exposed at a top end of said microelectronic assembly, and said first microelectronic element is disposed between said top and bottom ends.

20. (AMENDED) The method as claimed in claim 15, further comprising:

attaching a second microelectronic element to said flexible substrate; and

vertically aligning the first and second microelectronic elements with one another during the folding step.